उपग्रह

UPAGRAH

NEWSLETTER

ಉಪಗ್ರಹ

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यू. आर. राव उपग्रह केन्द्र, विमानपुर, बेंगलूरु - 17 **U. R. RAO SATELLITE CENTRE,** VIMANAPURA, BENGALURU - 17 ಯು. ಆರ್. ರಾವ್ ಉಪಗ್ರಹ ಕೇಂದ್ರ, ವಿಮಾನಪುರ, ಬೆಂಗಳೂರು - 17

GSAT-29 Loading into Thermovac Chamber

UPAGRAH EXTENDS A WARM WELCOME TO OUR NEW DIRECTOR SHRI P. KUNHIKRISHNAN

Shri P. Kunhikrishnan assumed charge as Director, U R Rao Satellite Centre (URSC), Bengaluru, on 1st August, 2018.

He Joined ISRO in 1986 at Systems reliability entity of Vikram Sarabhai Space Centre (VSSC). He was the Director of Satish Dhawan Space Centre SHAR, Sriharikota, the Spaceport of India from June, 2015 to July, 2018. During June 2010 to March 2015 he had played significant role as the Project Director of Polar Satellite Launch Vehicle (PSLV).

Shri P. Kunhikrishnan is the recipient of ISRO Individual Merit Award for the year 2010, Astronautical Society of India (ASI) Award for the year 2011, ISRO Performance Excellence Award in 2013, ISRO Team Excellence Award-2013 as Team Leader of PSLV C-25/Mars Orbiter Mission and Swadeshi Sastra Puraskar for the year 2015.

He is the National President of Indian Society of Systems for Science & Engineering - ISSE, Fellow of INAE and Fellow of AP Academy of Sciences. In recognition of his outstanding contributions, Jawaharlal Nehru Technological University (JNTU), Anantapur, Andhra Pradesh has conferred him with Honorary Degree of Doctor of Science in the year 2016. He has also been honoured with the Vigyan Pratibha Samman 2017 by the Government of Madhya Pradesh.

He has represented ISRO in various international conferences and events.

Editorial

Dear Readers,

URSC has accomplished several major milestones towards achieving the organisation's vision. It had an industry interface with reputed organisations such as Bharat Electronics Limited, Alpha Design Technologies and Tata Advanced Systems Limited. URSC is gearing up for several spacecraft launches that will augment ISRO's satellite services to our society. UPAGRAH thanks the readers and contributors for regularly sharing articles to make every issue a collector's copy.

We take pleasure in informing our readers that January, 2019 onwards, UPAGRAH will turn into a monthly news letter in a revamped format. It will bring to you a monthly compilation of URSC activities / write-ups / articles.

Editorial Committee

HYPERSPECTRAL IMAGING SATELLITE (HySIS)

Introduction

Hyper-Spectral Imaging Spectrometer systems are increasingly being used in the field of remote sensing from airborne and space-borne platforms for a variety of applications. HySIS spacecraft carries the Hyper Spectral Compact Imager imaging in VNIR (Visible and Near Infrared) (0.4 to 0.9μm) and SWIR (Shortwave Infrared) (0.85 to 2.4μm) spectral region in 60 and 256 contiguous spectral bands respectively, with 10nm bandwidth providing 30m spatial resolution and covering a swath of 30km at 630km orbit. The HySIS mission will provide global coverage on repetitive basis to users and also supplement the existing multi-spectral missions. The HySIS spacecraft is based on standardized SARAL bus with improvements. The satellite is planned to be placed in 630 km polar sun-synchronous orbit. The designed life of mission shall be 5 years.

Mission Objectives

- To provide coverage on a repetitive basis to users that will supplement the data provided by the existing multi spectral sensors
- To provide high spectral resolution observations of geochemical and geophysical variables over the wave length range of 400nm to 2400nm in contiguous 10nm wide spectral bands with a spatial resolution of 30 meters
- To observe and develop a wide range of applications in agriculture, forestry, soil/geological environments, coastal zones and inland waters etc.

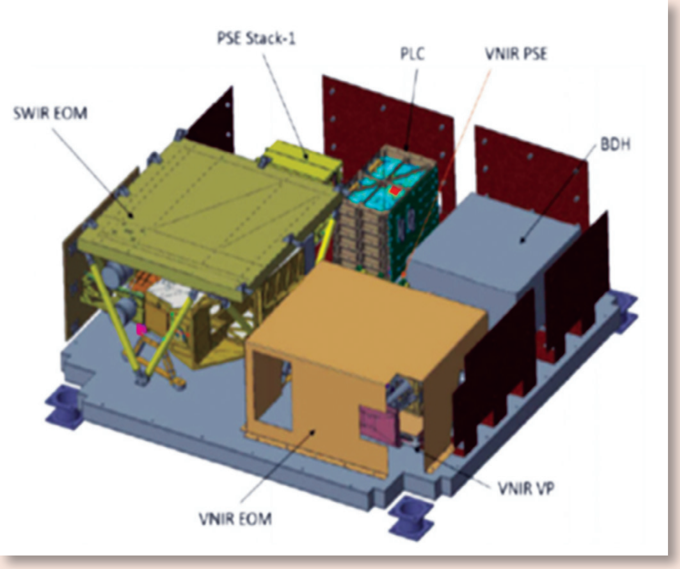
Nominal Orbit Parameters

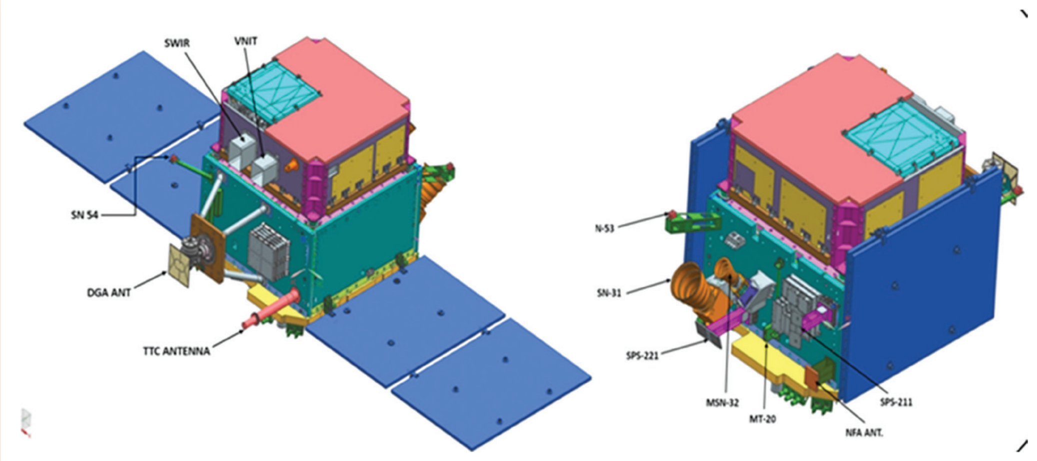
Altitude	630km
Inclination	97.95°
Repeat Cycle	133 orbits in 9 days
Mean Local Time	10:00 AM
Period	5846.6 seconds
Path-to-path distance	301.3 km
Distance between two consecutive orbits	2711.8 km
Revisit with +/- 26 deg roll bias	Max. 5 days with ± 26° roll bias

Spacecraft Configuration

HySIS spacecraft is configured with two Payloads – SWIR and VNIR hyperspectral imagers, mounted on PIM, as shown in the figure.

HySIS is based on IMS-2 bus (400kg class), which consists of a mainframe bus and a Payload Interface Module (PIM) interfaced with 4 titanium pads. This spacecraft is sun oriented spacecraft in sun synchronous orbit (630km altitude and 10:00 AM Equator Crossing Time).





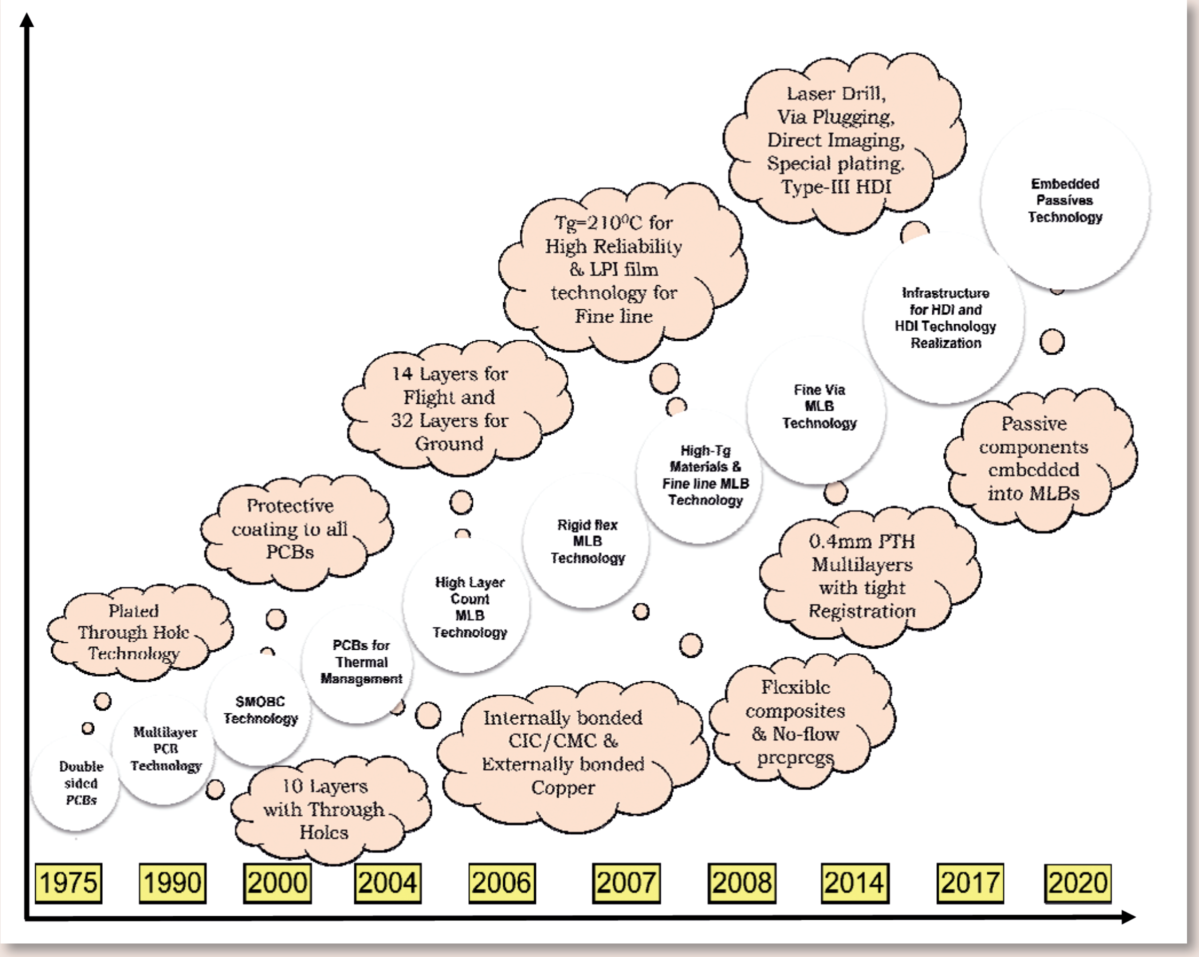
Deployed Configuration & Stowed Configuration

Mass	~380kg
Overall Size	2.158m (Yaw) x 1.387m (Roll) x 1.157m (Pitch) – In stowed configuration
Launch Vehicle	PSLV-C43
Structure	Aluminum Honeycomb with Aluminum faceskin – Mainframe Aluminum Honeycomb with CFRP faceskin – PIM
Payload	VNIR and SWIR
Power Systems	Solar panels (2 wings, 2 panels per wing) on either side of Spacecraft along Roll Axis (730W EOL with one string failure), 30-42V Raw Bus, 67.2Ah Li-Ion battery, Core and Distribution Power electronics package and DC/DC converters
Structures	Modified IMS-2 cuboidal structure with PIM on 4 point interface
AOCS	OBC with 4MB memory, 1 Mark-2 Star Sensor, 1 Micro Star Sensor, 4π Sun Sensors, Magnetometers, 10Nm-s and 0.1 Nm capacity Reaction wheels, Wheel drive electronics, eight 1N canted thrusters, 20Am2 Torquers, IRU and its electronics 3 axis body stabilized spacecraft with 0.05° (3) pointing accuracy and 5.0×10^{-4} °/s (3s) drift rate
RF Systems	S-Band Receiver, S-Band Transmitter and Diplexer, S-band TTC (Main) antenna and Null filling patch antenna, DGA and SPS–Rx with its antenna, X-Band Filter, X-Band Transmitter and X-Band SSPA. Payload data rate of 2 X 160 Mbps, QPSK (using DGA) Telemetry data rate of 64 Kbps, PCM/BPSK (after convolution coding) TC Uplink 4Kbps, FM/PSK/PCM
Data Handling	BDH & 600 GB SSR
RCS	Propellant tank, latch valve, Filter, Pressure Transducer and 1N Thrusters (8 Nos.)
Thermal	MLI, Heaters and temperature sensors
Integration	EDS, Grounding and other AIT elements

Tanmay Marathe, *MicroSat/HysIS Projects*

PRINTED CIRCUITS & HDI FACILITY

Printed Circuits Technology Road map towards HDI:


Double sided PCBs
Multilayer PCB Technology
Plated Through Hole Technology
SMOBC Technology
Protective coating to all PCBs
10 Layers with Through Holes
PCBs for Thermal Management
14 Layers for Flight and 32 Layers for Ground
High Layer Count MLB Technology
Internally bonded CIC/CMC & Externally bonded Copper
Rigid flex MLB Technology
Tg=210°C for High Reliability & LPI film technology for Fine line
High-Tg Materials & Fine line MLB Technology
Flexible composites & No-flow prepregs
Fine Via MLB Technology
0.4mm PTH Multilayers with tight Registration
Laser Drill, Via Plugging, Direct Imaging, Special plating, Type-III HDI
Infrastructure for HDI and HDI Technology Realization
Passive components embedded into MLBs
Embedded Passives Technology
1975
1990
2000
2004
2006
2007
2008
2014
2017
2020

Printed Circuits & High Density Interconnect Facility (PCHF) at URSC was established in the year 1974 for the fabrication of Single-sided (SS) and Double-sided (DS) Printed Circuit Boards (PCBs) used for both onboard and ground applications. Later in the year 1984 and onwards, it was augmented for the fabrication of Multilayer PCBs. PCHF is equipped with state of the art equipments for PCB fabrication including Laser Photoplotter, Multilayer Registration System, Vacuum Multilayer Laminating Press, CNC Drilling/Routing Systems, Plasma Etching System, UV Exposure system, Solder Mask Coating System, Automatic Optical Inspection System, Wet Process Systems, Electroless Copper (PTH) line, Copper & Tin/Tin-lead Electroplating Line and Hot Air Solder Levelling Systems.

Presently, Printed Circuits & HDI Facility (PCHF) / SPA at URSC is capable of manufacturing a wide variety of PCBs to meet various demands of spacecraft electronic packaging technologies in ISRO. We also support other ISRO centres: LEOS, VSSC, SAC, IISU, LPSC, SCL, etc for complex circuit boards.

Established PCB Technologies at ISITE:

- Single sided & Double sided PTH PCBs
- Multi Layer PCBs (Up to 14 Layer for Onboard application & 32 layer for ground application)
- Rigid flex Multilayer PCBs
- Metal Core Multilayers, externally bonded Copper MLBs for Heat Sink and Resin Filled

- Buried via Multilayer PCBs
- Controlled Impedance and Fine-line Multilayers (5mil line & 4mil spacing)

Upcoming HDI (High Density Interconnect) PCB Technology at HDI Facility / ISITE:

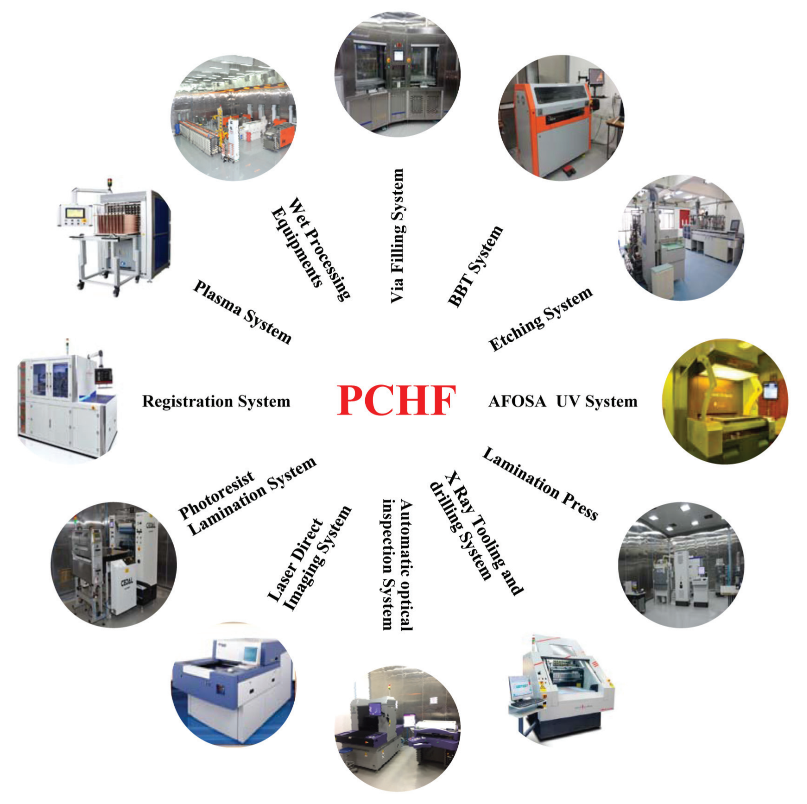
HDI boards, one of the fastest growing technologies in PCBs. HDI Boards contain blind and/or buried vias and often contain microvias of 150micron or less in diameter. They have a higher circuitry density than traditional circuit boards. There are 6 different types of HDI boards, through vias from surface to surface, with buried vias and through vias, two or more HDI layer with through vias, passive substrate with no electrical connection, coreless construction using layer pairs and alternate constructions of coreless constructions using layer pairs.

Key HDI Benefits:

HDI technology enables, designers to have the option to place more components on both sides of the raw PCB. Multiple via processes, including via in pad and blind via technology, allow designers more PCB real estate to place components that are smaller even closer together. Decreased component size and pitch allow for more I/O in smaller geometries. This means faster transmission of signals and a significant reduction in signal loss and crossing delays.

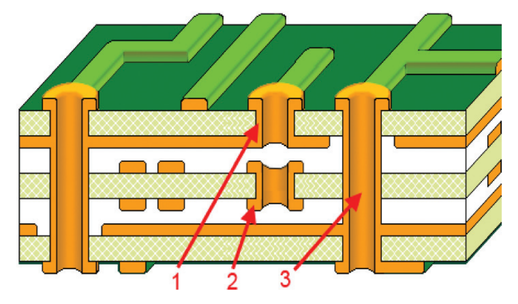
While some consumer products shrink down in size, quality remains the most important factor for the consumer. Using HDI technology during design, it is possible to reduce an 8-layer through-hole PCB to a 4-layer HDI micro-via technology packed PCB. The wiring capabilities of a well-designed HDI 4-layer PCB can achieve the same or better functions as that of a standard 8-layer PCB.

Facility Augmentation for HDI Technology at ISITE / URSC:

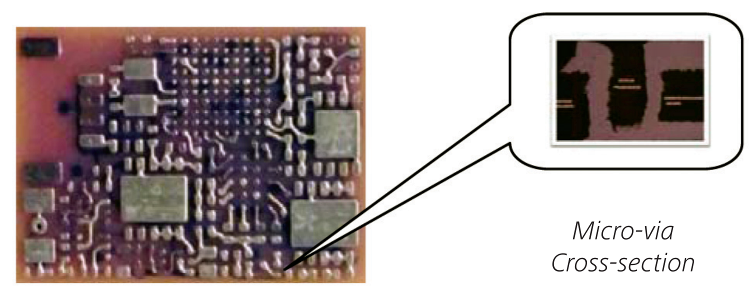

Wet Processing Equipments
Via Filling System
BBT System
Plasma System
Etching System
Registration System
PCHF
AFOSA UV System
Photoresist Lamination System
Lamination Press
Laser Direct Imaging System
Automatic optical inspection System
X Ray Tooling and drilling System

Realization of IPC Type-II HDI (PCB Sample) at HDI Facility, ISITE:

Specifications: Minimum Trace width / spacing: 3 mils, Minimum PTH: 0.3mm, Size: 9mm x 13mm, Via-in-pad with 0.125mm blind via, 0.2mm buried via. (1) Blind-via, (2) Buried-via and (3) Through-hole.

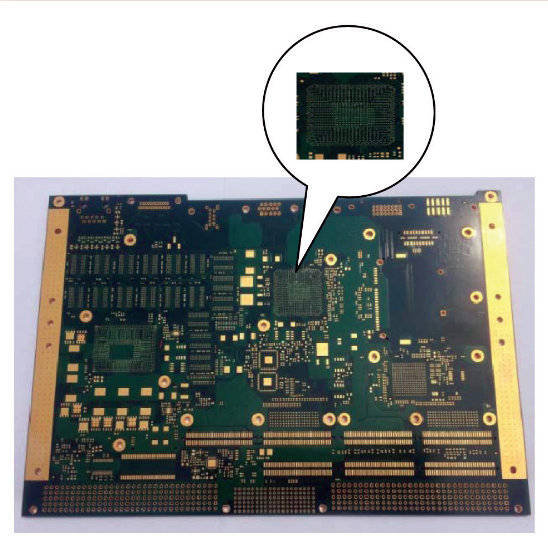


Cross sectional animation of PCB



PCB (HDI Type-2)

Realization of HDI PCB (Sample board) Type-III at HDI Facility with partial technical support from the vendor:



Technical Specifications:

HDI PCB Construction / Type: 2+N+2, 4 Blind-via layers
PCB Size: 233.2mm x 160mm
PCB Thickness: 2.28mm
Minimum BGA Pitch: 32 mils
Total number of layers: 18
Minimum Trace width: 3mils
Minimum conductor Space: 3 mils
Smallest laser drilled finished blind via: 3 mils
Smallest finished buried via: 6 mils
Smallest finished through hole: 6 mils
Plating aspect ratio: 1:12
BGA Pad diameter: 18 mils
Solder mask over bare copper: 1 mil
Metal finish: ENIG
Outer layer basic copper: ¼ Oz
Minimum inner layer annular ring: 25 microns
Minimum outer layer annular ring: 50 microns

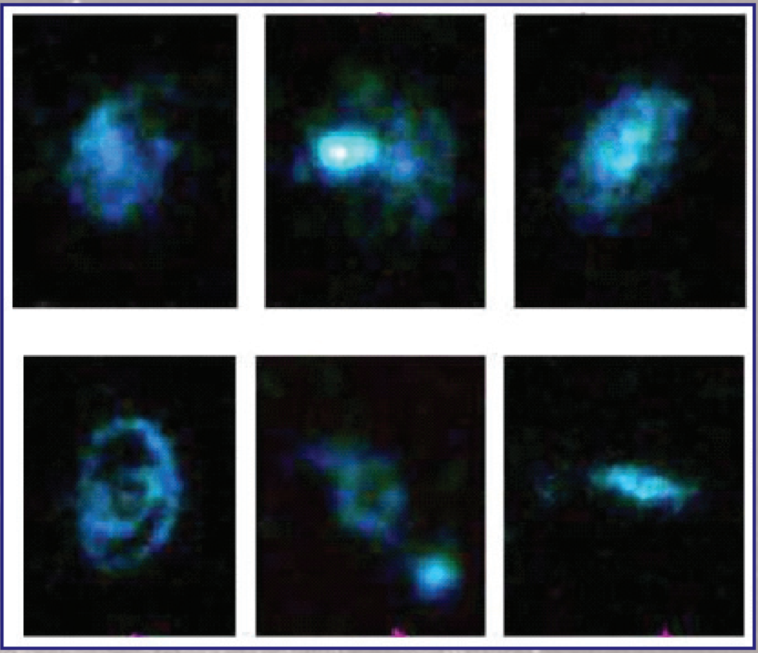
Hanumanth Rao C,
Manager, HDI Facility, PCHF - SPA, ISITE / URSC

URSC bids a warm farewell to its former Director Dr. M Annadurai *"Upagrah Wishes him All the Best"*

ASTROSAT: A JOURNEY OF DISCOVERIES

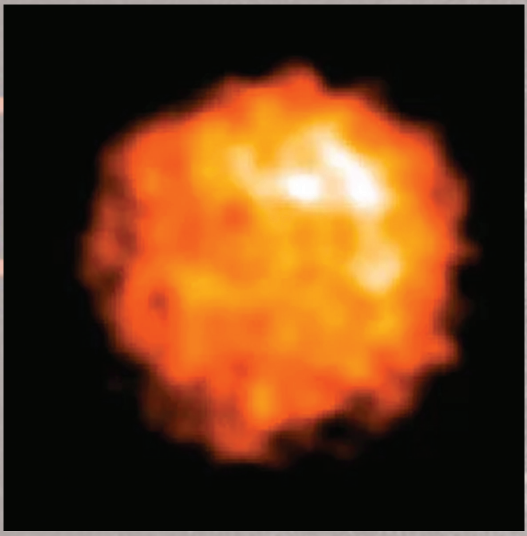
It has been three years! A dream project, ASTROSAT, India's first dedicated multi wavelength space observatory zoomed into the sky on PSLV-C30 into 650km orbit the 28th of September 2015.

Since then the instruments on board have been working non stop with their powerful multiband eyes wide open. There has been more than 80 publications from ASTROSAT so far which is bound to increase several fold with the release of the data to the public this September (available at https://astrobrowse.issdc.gov.in/astro.html).



Merging cluster of galaxies in Abell 2256

Picture credit - UVIT team



Tycho supernova remnant imaged by SXT

Picture credit: KP Singh and SXT team

While the scientists sweat their brow out peering through thick glasses, what we are eager to know is what the data really told us about the Universe. While it's a WOW almost every observation, we list out a few from the long list.

HIGHLIGHTS OF THE SCIENCE RESULTS

- Red stars are cool but still NGC 188 is bright in UV, a mystery that UVIT solved : It's a binary with a hot and cool star couple! UVIT has been revealing the universe in UV with one of the best angular resolutions ever.
- Polarisation in X rays is hard to observe. That's what CZT did from the crab pulsar. CZT detected a GRB confirming that the event is not related to Gravitational Wave detection that happened at a time very close to the GRB event
- Proxima Centauri our nearest neighbour was caught flaring by SXT.
- Combined analysis of data from SXT, LAXPC, CHANDRA resulted in finding a rapidly spinning black hole recently.
- LAXPC has detected high frequency QPOs (Quasi Periodic Oscillations). In black hole sources and burst oscillations in neutron start system.
- SSM in addition to providing light curves for more than 300 sources, has found beta class variability in a black hole binary and observed pulsations and outbursts.

Inputs by Dr. M C Ramadevi, SAG

EVENTS & VISITS

INDIAN SPACE RESEARCH ORGANISATION
ANTRIX CORPORATION LIMITED

Bengaluru Space Expo BSX-2018 held during 6th-8th September 2018 at BIEC

Bhoomi pooja of AITF-1 Extension at ISITE

Contract Signed with Multiple Vendors for Outsourcing of Satellite AIT Activities

Director URSC inagurates Canteen Renovation: Machinery Augmentation

Director URSC interacting with Sci / Eng - SC

Fire techinical drill MTU (Mobile Tank Unit)

Fostering Innovation Culture by Dr. Pavan Soni, IIM Bengaluru and founder of Inflexion Point Consulting

Director URSC interacting with Young Engineers

EVENTS & VISITS

HRDD Distinguished lecture series: Leadership & Learning in the Age of Disturbtion by Dr. Vishal Shah

Interaction of Newly Joined Technicians with Director & Orientation Programme

HRDD Leadership Development Workshop for Middle Level Management

HRDD Quality Management system-Lead Auditors Training Programme

Independence Day-2018 celebration at URSC

Industry Interface: Outsourcing of Spacecraft AIT Orientation Programme for Multiple Vendors

Industry Interface: URSC Signs MoU with Ms. Ajjree Engineering Industries Pvt Ltd, Gokul Shirgaon, Kolhapur for Heatpipe Productionisation

ISO Awareness programme

EVENTS & VISITS

Library User Awareness Programme

Quality Training Programme

Refreshers Training Programme for Techincal Assistants

Seminar Committee Lecture on 'A Real Life Journey Through Dreams'

Seminar Committee Lecture on 'Fuel Cell Power Systems'

Seminar on Terahertz Science Technology and their applications by Scientist from JPL, NASA

Soft Skills Training Programme for Sci/Eng-SC

Training Programme For Mechanical Technicians

EVENTS & VISITS

Visit of the Members of Japanese House of Representatives

Visit of Brazilian Air Chief Marshal to URSC

Visit of Honourable Chief Minister of Tripura to URSC

Visit of Delegation from Algerian Space Agency (ASAL) to URSC

Swachh Bharat Abhiyaan at Govt. High School, JB Nagar, Bengaluru

Swachh Bharat Abhiyaan at Govt. High school, Thorulakki, Kolar Dist.

Science Fact
Did you know?

Lithium is the lightest of all metals with density about half of that of water. Lithium carbonates are used extensively by Aluminium producers and in the glass and enamel industries. Lithium Stearate is used to make automotive greases from oils. The aerospace industry incorporates Lithium in its low-density Magnesium and Aluminium alloys. Also Lithium- Silicon alloys are increasingly used in batteries. Lithium batteries can be recharged safely and efficiently without the release of hydrogen gas, which is a dangerous by-product of alkaline batteries. Lithium is extremely conductive. It is used to produce high electrical power & it is popular in battery operated vehicles.

DOS-ISRO INTER CENTRE SPORTS MEET 2018 (ICSM 2018)

Space Sports Recreation and Promotion Board (SSRPB) constituted by Department of Space has been responsible for conducting Inter Centre Sports meet as per the DOS Roaster. The DOS- ISRO Inter Centre Sports Meet has been conducted regularly by the different ISRO Centres every alternate year. Inter Centre Sports Meet is conducted for Athletics & Indoor Games (Carom, Chess, Bridge, Shuttle Badminton & Table Tennis) together and Outdoor games (Cricket, Football, Hockey, Lawn Tennis, Tennicoit (for women), Basket Ball, Volley Ball, Ball Badminton for both Men and Women).

This year the DOS-ISRO Inter Centre Sports Meet 2018 (ICSM-2018) for Athletics and Indoor games was hosted by SDSC- SHAR in two phases.

Phase - I (Athletics) – from 27.08.2018 to 31.08.2018 & Phase – II (Indoor games) from 03.09.2018 to 06.09.2018.

The Host Centre SDSC-SHAR conducted the ICSM 2018 Sports meet in a grand manner and around 1,200 participants from all 14 DOS-ISRO Centres participated in the Sports meet for Athletics and Indoor Games.

In Athletics – Phase – I VSSC, Thiruvanantapuram emerged as CHAMPIONS by earning 128 Points. URSC, Bengaluru emerged as RUNNERS UP by earning 108 Points. It may be noted that URSC, Bengaluru have achieved this feat after a decade in the Athletics Sports Meet.

It is to place on record that the URSC Participants - Seniors and the Young Athletes in both Men & Women Category performed well and have attracted attention during the entire show of the Athletic Events of ICSM – 2018.

The achievement of Ms. Akanksha Baggan, Sci./Eng. – 'SC', TSG, URSC is highly noteworthy. She bagged 05 Gold Medals and earned the Individual Championship in the Women (Open) Category of Athletics.

In Indoor games - Phase II: URSC, Bengaluru became the WINNERS and emerged as CHAMPIONS by earning 93 Points and a record has been maintained by URSC since so many years by becoming the WINNERS / FIRST PLACE in Indoor Game events.

By taking into account the overall points of Phase I & II (108+93 =201 Points), URSC, Bengaluru has emerged as the OVERALL CHAMPIONS of ICSM 2018 in Athletics and Indoor Games.

It is to place on record that prior to the ICSM 2018 Sports Meet, the URSC employees / Participants were motivated with the encouraging talk by the Director, URSC. This added to their zeal for performing better and becoming the OVERALL CHAMPIONS of ICSM – 2018. On behalf of the Participants, URSC Welfare Association / URSC, Sports Council conveys their sincere thanks to Director, URSC, Bengaluru

Satish S A,
Secretary, SSRPB/DOS-ISRO

UNVEILING THE BUST & PORTRAIT OF FOUNDER DIRECTOR OF URSC PROF. U R RAO

The announcement of the renaming of ISRO Satellite Centre (ISAC) as U R Rao Satellite Centre (URSC) was officially made by none other than the Hon'ble Prime Minister of India, Shri Narendra Modi in his address to the ISRO/DOS. However, a grand ceremony it had to be, to formalize the change and to herald the same to the world at large.

On 26th July 2018, Dr. K Sivan, Chairman, ISRO/Secretary, DOS, led from the front in institutionalizing the new name of ISRO Satellite Centre (ISAC) as U R Rao Satellite Centre (URSC) as a befitting tribute to its founder Director, Prof. U R Rao.

Preceding the assembly programme at the auditorium, the URSC Community gathered in front of the main building lawns for the august ceremony of unveiling of the specially designed bust of Prof. U R Rao. This was followed by unveiling of his life size portrait in main building lobby.

Following the National Anthem and the invocation, the programme started with a brief on the day's agenda. A video documentary mirroring the life and works of Prof. U R Rao which was specially produced for the occasion was screened.

In his opening remarks, Director, ISAC Dr. M Annadurai vividly recalled his early days at ISAC and how he was greatly influenced by Prof. U R Rao. He recalled that, Prof. U R Rao was a mentor and guide to many in ISRO as he was to him.

It was then the turn of the erstwhile Directors of ISAC who followed Prof. U R Rao to reminisce their associations with Prof. U R Rao and recall the various facets of his personality.

Dr. T K Alex, Dr. P S Goel (through a video clip), Dr. R Aravamudan and Dr. K Kasturirangan were all praise for Prof. U R Rao. In a nutshell they summed up the fact that Prof. U R Rao was a winner all through and setbacks and failures did not deter him.

The artists who sculpted the bust of Prof. U R Rao and painted the portrait were felicitated on the occasion.

The presence of Prof. U R Rao's daughter Ms. Mala Rao and her children, son Dr. Madan Rao and close relatives in the function added flavor to the function. Ms. Mala Rao and Dr. Madan Rao were felicitated on the occasion for their support to Prof. U R Rao in being what he was.

In his presidential address, Dr. K Sivan, Chairman, ISRO/Secretary, DOS recalled that Prof. U R Rao was rated as one of the 10 most influential persons in the field of space by the Space News Magazine.

Upagrah salutes the great soul.

Santhosh Hebbar P, *Head, STDD, PPEG*

UPAGRAH CONGRATULATES

Annual Excellence Service Awardees for 2017

Smt Rama M B
Sci.Engr. 'SF'
Head, LDD

Shri Vasudeva R
Project Personal Secy,
Facilities

Smt B Chaya
Project Personal Secy,
PMPG

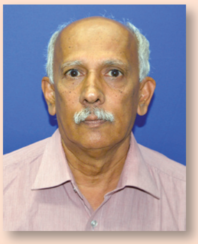
Shri Lakshmipathy
Purchase & stores Officer.
Purchase

Smt Mani Meghalai
Sr. Project Asst.
P & GA

Shri Suresh M Hebballi
Admn. Officer
P & GA

Shri M Purushothama
Fireman 'E'
Safety

Smt Sujatha Kumari
Sr. Hindi translator
P & GA


Shri Suresh Karnik S
Sci.Engr. 'SG'
C & MG

Smt Katyayini
Accounts Officer
Accounts

Winners of pan ISRO competition titled Quality Assurance: The Way Forward held at ISRO HQ

Best Paper Presentation Award

Shri KOSURU SAI MALLESWAR, Sci./Eng.-SD, of Communication Systems Group, has received the **'Best Paper Presentation Award'** in the International Conference on Communication and Computing Technology (ICCCT-2018), held at New Delhi during 7th-8th September, 2018, for his technical paper titled **"Design and Realization of Data Transmitter for Video Streaming of On-board Deployments in Geostationary Spacecrafts"** co-authored by Khan Afzaal, Himani B S, Sirshendu Das, Rajeev Ranjan, Rahul Sharma, Srinivasa Rao G, Neelavathy M and D V Ramana.

Ph.D Award

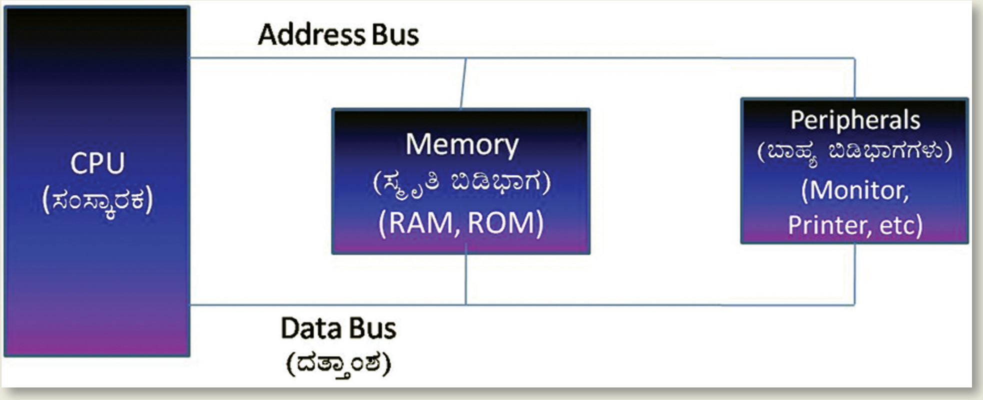
Shri K.V.Maruthi Prasad, Scientist / Engineer 'SG', Division Head, Mission Software Quality Assurance Division has been awarded Ph. D. Degree by Visvesvaraya Technological University, Belagavi for his Thesis titled **"Secure Software for Indian Spacecraft Ground Software Elements, GEOSCHEMACS".** The thesis proposes a security framework for GEOSCHEMACS software.

ಉಪಗ್ರಹಗಳಲ್ಲಿ ತಂತ್ರಾಂಶದ ಬಳಕೆ ಮತ್ತು ದೃಢೀಕರಣ – ಒಂದು ಕಿರುನೋಟ

ಇಸ್ರೋ ಸಂಸ್ಥೆ ಭಾರತದ ಘನತೆಯನ್ನು ಹೆಚ್ಚಿಸಿದೆ ಎಂಬುದು ಎಷ್ಟು ಸತ್ಯವೋ, ತಂತ್ರಾಂಶಗಳ ಬಳಕೆ ಉಪಗ್ರಹಗಳ ಕಾರ್ಯಕ್ಷಮತೆಯನ್ನು ದುಪ್ಪಟ್ಟುಗೊಳಿಸಿದೆ ಎಂಬುದು ಅಷ್ಟೇ ಸತ್ಯ. ಉಪಗ್ರಹಗಳಲ್ಲಿ ತಂತ್ರಾಂಶಗಳ ಸಹಾಯವಿಲ್ಲದೆ ಉಪವ್ಯವಸ್ಥೆಯ (SubSystem) ರಚನೆ ಕಷ್ಟಸಾಧ್ಯ. ಈ ಲೇಖನದ ಮುಂದಿನ ಸಾಲುಗಳಲ್ಲಿ ಉಪಗ್ರಹಗಳ ಉಪವ್ಯವಸ್ಥೆ ಘಟಕದ ಬಿಡಿಭಾಗಗಳಲ್ಲೇ ಅಡಕವಾಗಿ, ಅಗೋಚರವಾಗಿ ಕಾರ್ಯತಂತ್ರಗಳಿಗೆ ಉತ್ತೇಜನ ನೀಡುವ ತಂತ್ರಾಂಶದ ಬಗ್ಗೆ ಒಂದು ಕಿರುನೋಟವನ್ನು ನೀಡಲಾಗಿದೆ.

ವಿಶ್ವದ ಯಾವುದೇ ಭಾಷೆಯು ಅಕ್ಷರಗಳಿಂದಾದ ಪದಗಳ ವ್ಯಾಕರಣಬದ್ಧ ಪ್ರಯೋಗದಿಂದ ಕೂಡಿರುತ್ತದೆ. ಈ ಭಾಷೆಗಳೇ ಮಾನವರ ಪರಸ್ಪರ ವಿಚಾರ ವಿನಿಮಯವನ್ನು ಸಾಧ್ಯವಾಗಿಸುತ್ತವೆ. ಹಾಗೆಯೇ ವಿದ್ಯುನ್ಮಾನ ಬಿಡಿ ಭಾಗಗಳ ನಡುವಿನ ಸಂವಹನಕ್ಕೆ ವಿದ್ಯುತ್‌ಸಂಜ್ಞೆ ಅಥವಾ ವಿದ್ಯುತ್‌ಸಂಕೇತವೇ ಭಾಷೆಯಾಗುತ್ತದೆ. ಈ ವಿದ್ಯುನ್ಮಾನ ಬಿಡಿ ಭಾಗಗಳಿಂದ ಬರುವ ಕ್ರಿಯೆ ಮತ್ತು ಪ್ರತಿಕ್ರಿಯೆಯನ್ನು ಸಂಗ್ರಹಿಸಿಡಲು ಸ್ಮೃತಿ ಹೊಂದಿರುವ ಬಿಡಿ ಭಾಗಗಳಲ್ಲಿ (Memory Device/PROM/EEPROM) ವಿದ್ಯುತ್‌ಸಂಕೇತಗಳಿಂದ ಪ್ರಚೋದಿಸಿಲ್ಪಟ್ಟ ಶೂನ್ಯ–ಒಂದು (೦,೧) ಅಂಕಿಗಳನ್ನು ಸೂಚಿಸುವ ವಿದ್ಯುತ್‌ಸಂಕೇತಗಳನ್ನು ಸಂಗ್ರಹಿಸಿಡಬೇಕಾಗುತ್ತದೆ. ಈ ಶೂನ್ಯ ಮತ್ತು ಒಂದು ಅಂಕಿಗಳನ್ನೇ ನಾವು ಸಮಾನ್ಯವಾಗಿ ವಿದ್ಯುನ್ಮಾನ ಭಾಷೆಯಲ್ಲಿ ದ್ವಿಮಾನಾಂಶ (Binary Digits) ಎಂದು ಕರೆಯುತ್ತೇವೆ. ಈ ಅಕ್ಷರಗಳ ನಿರ್ದಿಷ್ಟ ಸಂಖ್ಯೆಯ ಗುಂಪಿಗೆ ಮಾನವನ ಆಡುಭಾಷೆಯ ವ್ಯಾಕರಣಬದ್ಧ ಅಕ್ಷರಗಳ ಜೋಡಣೆಯ ಕ್ರಿಯೆಯಿಂದ ಹೊರಹೊಮ್ಮಿದ ಪದಗಳಿಗೆ ವಿದ್ಯುನ್ಮಾನ ಬಿಡಿಭಾಗಗಳ ಮಾರ್ಗಸೂಚಿ (Instruction set) ಎಂದು ಕರೆಯುತ್ತಾರೆ. ಈ ಮಾರ್ಗಸೂಚಿಗಳಿಂದ ರಚಿಸಲ್ಪಟ್ಟ ತಂತ್ರಾಶದ ಭಾಷೆಯನ್ನು ಕೆಳಪಂಕ್ತಿ ಭಾಷೆ (Low Level/ Assembly Language) ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ. ದ್ವಿಮಾನಾಂಶಗಳನ್ನು ಅರ್ಥೈಸುವುದು ಕಷ್ಟವಾದುದರಿಂದ ಈ ತರಹದ ಕೆಳಪಂಕ್ತಿ ಭಾಷೆ ಹುಟ್ಟಿತು. ಜಾರ್ಡನ್ ಮೊರೆಯ ತತ್ವದ ಪ್ರಕಾರ, ಸ್ಮೃತಿ ಹೊಂದಿರುವ ಬಿಡಿಬಾಗಗಳ ಸಾಂದ್ರತೆ ಹೆಚ್ಚಿದಂತೆ, ಜಟಿಲವಾಗುವ ಸಮಸ್ಯೆಗಳನ್ನು ಸುಲಲಿತವಾಗಿ ಬರೆಯಲು ಕೆಳಪಂಕ್ತಿ ಭಾಷೆಯ ಮೇಲೊಂದು ಭಾಷೆ ಹುಟ್ಟಿತು. ಅದನ್ನೇ ನಾವು ಮೇಲ್ಪಂಕ್ತಿ ಭಾಷೆ (High Level Langauge) ಎಂದು ಕರೆಯುತ್ತೇವೆ. ಈ ತಂತ್ರಾಂಶದ ಭಾಷೆಗಳು ವಾಣಿಜ್ಯೀಕರಣಕ್ಕೆ ದಾರಿ ಮಾಡಿಕೊಟ್ಟಿತು. ಪ್ರತಿಯೊಂದು ಸಂಸ್ಕಾರಕಗಳ (Processor) ಮಾರಾಟಗಾರ ತನ್ನದೇ ಕೆಳಪಂಕ್ತಿ ಭಾಷೆಯನ್ನು ಸೃಷ್ಟಿಸಿದ. ಈ ಎಲ್ಲಾ ತಂತ್ರಾಂಶದ ಭಾಷೆಗಳನ್ನು ಇನ್ನಿತರ ಭಾಷೆಗಳಿಗೆ ಪರಿವರ್ತನೆ ಮಾಡಲು ಹುಟ್ಟಿದ ತಂತ್ರಾಂಶವೇ ಪರಿವರ್ತಕ ತಂತ್ರಾಂಶಗಳು (Compiler ಮತ್ತು Assembler).

ಉಪಗ್ರಹಗಳಲ್ಲಿ ತಂತ್ರಾಂಶದ ಬಳಕೆ:–ಈ ತಂತ್ರಾಂಶದ ಬಳಕೆಯಿಂದಾಗುವ ಉಪಯೋಗಗಳನ್ನೊಮ್ಮೆ ಅವಲೋಕಿಸೋಣ!!. ಸಹಜವಾಗಿ ಯಾವುದೇ ಸಂವೇದಕ/ಸಂಜ್ಞಾಪರಿವರ್ತಕ(Sensor) ಭೌತಿಕಶಕ್ತಿಯನ್ನು ಮತ್ತೊಂದು ಪರ್ಯಾಯ ಶಕ್ತಿಯಾಗಿ ಪರಿವರ್ತನೆ ಮಾಡುತ್ತದೆ. ಇಲ್ಲಿ ವಿದ್ಯುತ್‌ಶಕ್ತಿಯಾಗಿ ಪರಿವರ್ತನೆ ಮಾಡುವ ಸಂವೇದಕಗಳನ್ನು ಮಾತ್ರ ಗಣನೆಗೆ ತೆಗದುಕೊಂಡಿರುತ್ತಾರೆ. ಈ ಸಂವೇದಕಗಳು ಏನನ್ನು ಸೂಚಿಸುತ್ತದೆ ಎಂದು ತಿಳಿಯಲು ಹಾಗೂ ನಂತರ ಆ ದತ್ತಾಂಶದಿಂದ ಏನನ್ನು, ಯಾವ ಕಾಲಕ್ಕೆ ಮತ್ತು ಎಷ್ಟರ ಮಟ್ಟಿಗೆ ನಿಯಂತ್ರಣಕ್ಕೆ ತೆಗದುಕೊಳ್ಳಬಹುದು ಎಂಬುದನ್ನು ತಡೆರಹಿತವಾಗಿ ತಿಳಿಯಲು ತಂತ್ರಾಂಶದ ಮೊರೆ ಹೋಗುವುದು ಒಳಿತು. ಸಾಮಾನ್ಯವಾಗಿ ವಿದ್ಯುನ್ಮಾನ ಡಿಜಿಟಲ್ ಬಿಡಿಭಾಗಗಳಿಂದ ರಚಿತವಾದ ಯಂತ್ರಾಂಶ ತನ್ನೊಳಗೆ ಪ್ರವಹಿಸುವ ವಿದ್ಯುತ್‌ಶಕ್ತಿಯ ಸಹಾಯದಿಂದ ಕಾರ್ಯನಿರ್ವಹಿಸುತ್ತದೆ. ಈ ವಿದ್ಯುತ್‌ಪ್ರವಾಹವನ್ನು ನಿಯಂತ್ರಿತವಾಗಿ ಹರಿಯ ಬಿಡಲು ತಂತ್ರಾಶದ ನೆರವು ಪಡೆಯಬಹುದು ಹಾಗೂ ಇದರಿಂದ ಇಂತಹುದೇ ಉಪಯೋಗಗಳು ಇನ್ನೂ ಅನೇಕ ಇವೆ. ಈ ತರಹದ ಉಪವ್ಯವಸ್ಥೆಯನ್ನು ಚಿತ್ರದಲ್ಲಿ ತೋರಿಸಲಾಗಿದೆ.



ಭೂಮಿಯಿಂದ ಕಳುಹಿಸಲಾಗುವ ಆದೇಶವನ್ನು ಉಪಗ್ರಹದ ಉಪವ್ಯವಸ್ಥೆ ಮೊದಲು ಡಿಕೋಡ್ ಮಾಡಿ ಯಾವ್ಯಾವ ಉಪವ್ಯವಸ್ಥೆಗಳಿಗೆ ರವಾನೆ ಮಾಡಬೇಕು ಹಾಗೂ ಯಾವ ಅಂತರದಲ್ಲಿ ಆದೇಶಗಳನ್ನು ರವಾನಿಸಬೇಕು ಎಂಬ ಕಾರ್ಯತಂತ್ರ ರೂಪಿಸಲು ಈ ತಂತ್ರಾಂಶ ಬಳಕೆಯಾಗುತ್ತದೆ. ಇನ್ನು ಉಪಗ್ರಹದ ದೃಷ್ಟಿಕೋನ (Attitude) ಹಾಗೂ ಕಕ್ಷೆ(Orbit) ನಿಯಂತ್ರಣಕ್ಕೂ ಸಹ ಮೇಲ್ಪಂಕ್ತಿ ಭಾಷೆ ಅಥಾವ ಕೆಳಪಂಕ್ತಿ ಭಾಷೆಯನ್ನು ಬಳಸಲಾಗುತ್ತದೆ.

ತಂತ್ರಾಂಶ ದೃಢೀಕರಣದ ರೀತಿ ರಿವಾಜು:–

ತಂತ್ರಾಂಶದ ಮೌಲ್ಯಮಾಪನವನ್ನು ಈ ಕೆಳಗಿನಂತೆ ಕೈಗೊಳ್ಳಲಾಗುವುದು.

- ತಂತ್ರಾಂಶ ನಿರ್ವಹಿಸಬೇಕಾದ ಕಾರ್ಯ ಮತ್ತು ವಿನ್ಯಾಸದ ವಿಶ್ಲೇಷಣೆ
- ತಂತ್ರಾಂಶದ ಪರಾಮರ್ಶೆ (Review)

- ಸ್ವತಂತ್ರವಾಗಿ ಮತ್ತು ಘಟಕದ ಜೊತೆ ತಂತ್ರಾಂಶದ ಪರೀಕ್ಷೆ
- ಪರೀಕ್ಷೆಯ ಸಮಯದಲ್ಲಿ ಕಂಡು ಬಂದ ನ್ಯೂನತೆಯ ವಿಶ್ಲೇಷಣೆ, ಸರಿಪಡಿಸುವಿಕೆ ಮತ್ತು ಪುನರ್‌ಪರೀಕ್ಷೆ

ತಂತ್ರಾಂಶ ಮೌಲ್ಯಮಾಪನ ವಿಧಾನ

ತಂತ್ರಾಂಶವನ್ನು ಸಿದ್ಧಪಡಿಸುವ ಮೊದಲು ಕೆಲವು ನಿಯಮಗಳನ್ನು ಅನುಸರಿಸುವುದು ಕಡ್ಡಾಯವಾಗಿರುತ್ತದೆ. ಯಾವುದೇ ತಂತ್ರಾಂಶದ ಬಳಕೆಗೆ ಮುನ್ನ ತಂತ್ರಾಂಶದ ಅವಶ್ಯಕತೆಗಳ ಬಗ್ಗೆ ಪರಾಮರ್ಶೆಯ ಅಗತ್ಯವಿರುತ್ತದೆ. ವ್ಯವಸ್ಥೆಯ ಅವಶ್ಯಕತೆಗಳು ಹಾಗೂ ಉಪವ್ಯವಸ್ಥಾ ಅವಶ್ಯಕತೆಗಳ ಮಾಹಿತಿಗಳು ತಂತ್ರಾಂಶದ ಪರಾಮರ್ಶೆಗೆ ಸಹಕರಿಸುತ್ತವೆ. ಈ ಪರಾಮರ್ಶೆಗೆ ತಂತ್ರಾಂಶ ದೃಢೀಕರಿಸುವ ಅಭಿಯಂತರರಿಂದ ತೊಡಗಿ ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ಮಾಡುವವರು ಹಾಗೂ ವಿಷಯ ತಜ್ಞರೊಡನೆ ಚರ್ಚಿಸುವುದರ ಮೂಲಕ ತಂತ್ರಾಂಶ ಅಭಿವೃದ್ಧಿಯನ್ನು ಪ್ರಾರಂಭಿಸಲಾಗುತ್ತದೆ. ಈ ಪರಾಮರ್ಶೆಯ ಫಲಿತವಾಗಿ ತಂತ್ರಾಂಶ ಅವಶ್ಯಕತೆಗಳ ಮಾನದಂಡ (Software Requirements Specification) ರೂಪುಗೊಳ್ಳುತ್ತದೆ. ತಂತ್ರಾಂಶ ಅವಶ್ಯಕತೆಗಳ ನಿರ್ದಿಷ್ಟತೆಯನ್ನು ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ಮಾಡುವ ಅಭಿಯಂತರರು ಹಂತ ಹಂತವಾಗಿ ನಿಯಮಾವಳಿಯ ಪ್ರಕಾರ ಗಣಕಯಂತ್ರಗಳಿಗೆ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ಬರೆಯುವುದಕ್ಕೆ ಮೊದಲು ಮಾನವನ ನೈಸರ್ಗಿಕ ಭಾಷೆಯ ಮೂಲಕ ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ದಸ್ತಾವೇಜು (Software Design Document) ತಯಾರಿಸುತ್ತಾರೆ.

ಈ ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ದಸ್ತಾವೇಜನ್ನು ಪರಾಮರ್ಶೆಗೆ ಗುರಿಪಡಿಸಲಾಗುತ್ತದೆ. ಇಲ್ಲಿಯು ಕೂಡ ತಂತ್ರಾಂಶ ಧೃಢೀಕರಿಸುವ ಅಭಿಯಂತರರಿಂದ ಹಿಡಿದು ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ಮಾಡುವವರು ಹಾಗೂ ವಿಷಯ ತಜ್ಞರೊಡನೆ ಚರ್ಚೆಯು ನಡೆಯುತ್ತದೆ. ಕೋಡಿಂಗ್ (ತಂತ್ರಾಶದ ಬರವಣಿಗೆ) ಪ್ರಕ್ರಿಯೆಯ ನಂತರ ತಂತ್ರಾಂಶ ದೃಢೀಕರಿಸುವ ಅಭಿಯಂತರರು ತಂತ್ರಾಂಶ ಅವಶ್ಯಕತೆಗಳ ನಿರ್ದಿಷ್ಟತೆ ಹಾಗೂ ತಂತ್ರಾಂಶ ವಿನ್ಯಾಸ ದಸ್ತಾವೇಜನ್ನು ಕೋಡ್‌ಗೆ ತಾಳೆಮಾಡಿ ತಂತ್ರಾಂಶದ ಅವಶ್ಯಕತೆಗಳನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ಅಳವಡಿಸಿಕೊಂಡಿದೆಯೇ ಎಂದು ತಪಾಸಣೆ ಮಾಡುತ್ತಾರೆ. ಈ ಪ್ರಕ್ರಿಯೆಗೆ ಕೋಡ್ ತಪಾಸಣೆ (Code Inspection) ಎಂದು ಕರೆಯುತ್ತಾರೆ. ಈ ಪ್ರಕ್ರಿಯೆಗಳಲ್ಲಿ ಪ್ರಮಾಣ (Standard) ಮತ್ತು ಮಾರ್ಗದರ್ಶನಗಳ(Guidelines) ಅಳವಡಿಕೆಯನ್ನು ಪರೀಕ್ಷಿಸುವುದುಂಟು.

ಈ ಎಲ್ಲಾ ಪ್ರಕ್ರಿಯೆಗಳ ನಡುವೆ ಯಾವುದೇ ಹಂತದಲ್ಲಿ ದೋಷ ಕಂಡುಬಂದಲ್ಲಿ ಹಿಂದಿನ ಹಂತಕ್ಕೆ ಮರಳಿ ಅದರ ದೋಷವನ್ನು ತಿದ್ದುಪಡಿಸಿದ ನಂತರ ಮುಂದುವರೆಯುವ ಕ್ರಿಯೆಗೆ ಪುನರಾವರ್ತನೆ ಜಲಪಾತ ತಂತ್ರಾಂಶ ಅಭಿವೃದ್ಧಿ (Waterfall Development Model) ಶೈಲಿಯೆಂದು ಕರೆಯುತ್ತಾರೆ.

ಪ್ರಸನ್ನ ಕುಮಾರ್ ಎನ್
ಆರ್ ಕ್ಯು ಎ ಜಿ

Anniversary of Satellites in orbit

Satellites	Mission	Launch Mass	Launch date	Launch site	Launch vehicle
INSAT-3D Completes Five Years in Orbit	Meteorological; Search & Rescue Services	2060 kg	July 26, 2013	Kourou, French Guiana	Ariane-5 VA-214
GSAT-6 Completes Three Years in Orbit	Communication	2117 kg	August 27, 2015	SDSC SHAR, Sriharikota	GSLV-D6
GSAT-7 Completes Five Years in Orbit	Communication	2650 kg	August 30, 2013	Kourou, French Guiana	Ariane-5 VA-215
INSAT-3DR Completes Two Years in Orbit	Meteorological satellite	2211 kg	September 8, 2016	SDSC SHAR, Sriharikota	GSLV-F05
SCATSAT Completes Two Years in Orbit	Climate & Environment	371 kg	September 26, 2016	SDSC SHAR, Sriharikota	PSLV-C35
ASTROSAT Completes Three Years in Orbit	Scientific Satellite	1515 kg	September 28, 2015	SDSC SHAR, Sriharikota	PSLV-C30

हिंदी पखवाडा एवं हिंदी दिवस समारोह

संघ सरकार की नीति के अनुसार हर वर्ष 14 सितंबर को हिंदी दिवस मनाया जाता है। इस उपलक्ष्य में दिनांक 14 सितंबर, 2018 को निदेशक यू.आर.एस.सी. द्वारा हिंदी में अधिकाधिक काम करने हेतु एक अपील जारी किया गया। साथ ही दिनांक 30.08.2018 से 18.09.2018 तक केंद्र में हिंदी पखवाडा का आयोजन किया गया। इस दौरान कुल 18 प्रतियोगिताओं का आयोजन किया गया। इसमें हिंदी भाषी व हिंदीत्तर भाषियों के लिए अलग से हिंदी टिप्पण एवं आलेखन, समाचार वाचन, पाठन प्रतियोगिता, सुलेखन प्रतियोगिता, कविता लेखन, गायन, जीभ अमेठुआ, तस्वीर क्या बोलती है, अंताक्षरी, विविधा, श्रुतलेखन आदि प्रतियोगिताओं का आयोजन किया गया। इसमें काफी संख्या में पदाधिकारियों ने भाग लिया और लगभग 194 प्रतिभागियों को विजयी घोषित किया गया।

दिनांक 25.09.2018 को पुरस्कार वितरण समारोह का आयोजन किया गया। डॉ. मनोहर भारती, अध्यक्ष, अखिल कर्नाटक हिंदी साहित्य अकादमी, बेंगलूरु मुख्य अतिथि रहे। श्री. पी. कुन्हीकृष्णन, निदेशक, यू.आर.एस.सी. ने समारोह की अध्यक्षता की तथा अध्यक्षीय भाषण दिया। श्रीमती सीना राजेन्द्रन, वरिष्ठ हिंदी अधिकारी ने सभी का स्वागत किया। श्रीमती गीता प्रसाद, हिंदी अधिकारी ने राजभाषा गतिविधियों से संबंधित वार्षिक रिपोर्ट प्रस्तुत की। केंद्र में हिंदी पखवाड़ा के विभिन्न प्रतियोगिताओं के सभी विजेताओं, वार्षिक प्रोत्साहन योजना के विजेताओं तथा दसवीं एवं बारह्वीं कक्षा में अधिकतम अंक प्राप्त करने वाले विद्यार्थियों को मुख्य अतिथि ने प्रमाण पत्र वितरित किया।

अंतरिक्ष विभाग के आदेशानुसार, हिंदी में अधिक कार्य करने वाले अनुभाग/प्रभागों का आंतरिक तौर पर निरीक्षण किया गया तथा समीक्षा एवं प्रणाली समाकलन अनुभाग/समूह को शील्ड वितरित किया गया।

यू.आर.एस.सी. में हिंदी दिवस समारोह के दौरान सांस्कृतिक संध्या में यू.आर.एस.सी. के कर्मचारियों द्वारा भव्य सांस्कृतिक कार्यक्रम प्रस्तुत किया गया जिसमें शास्त्रीय वंदना, नृत्य, शास्त्रीय समूह नृत्य, स्टैंड-अप कामेडी, वाद्य जुगल बंदी आदि बहुत ही आकर्षक रहा।

हिंदी पखवाड़ा/दिवस समापन समारोह के अंत में श्री. शारिख, वरिष्ठ सहायक, हिंदी अनुभाग ने सभी का आभार प्रकट किया।

मासिक प्रतियोगिताएँ (जुलाई-सितंबर 2018)

संघ सरकार की नीति के अनुसार राजभाषा के प्रचार-प्रसार एंव विकास की गति बढ़ाने हेतु केंद्र में प्रति माह एक हिंदी प्रतियोगिता का आयोजन किया जाता है। इस क्रम में 09 जुलाई 2018 को केन्द्र के अधिकारी/कर्मचारियों के लिए युगल गायन प्रतियोगिता का आयोजन किया गया। श्री राघवेंद्र बी. कुलकर्णी तथा श्रीमती नलिनि प्रकाश, हिंदी अनुवादक ने उक्त प्रतियोगिता का संचालन किया। प्रतिभागियों ने बड़े ही उत्साह से प्रतियोगिता में भाग लिया।

यू.आर. राव उपग्रह केन्द्र, बेंगलूरु
हिंदी प्रतियोगिता

अगस्त 2018 माह में हिंदी भाषी अधिकारी/कर्मचारियों के लिए 10 तारीख को कविता लेखन प्रतियोगिता का आयोजन किया गया, श्रीमती अंजु दामोदरन, वरिष्ठ वैज्ञानिक उक्त प्रतियोगिता की निर्णायक रही।

राजभाषा के उत्कृष्ट निष्पादन हेतु यू.आर.एस.सी को प्रथम पुरस्कार

यू.आर. राव उपग्रह केंद्र, बेंगलूरु
U R Rao Satellite Centre, Bengaluru
नगर राजभाषा कार्यान्वयन समिति (का-1)
TOWN OFFICIAL GE IMPLEMENTATION COMMITTEE (O-1)
की आप सबका हार्दिक स्वागत है

नराकास (का.-1) के तत्वावधान में वर्ष 2017-18 के लिए राजभाषा के उत्कृष्ट निष्पादन हेतु प्रथम पुरस्कार प्राप्त करते हुए

नराकास, बेंगलूरु (का.-1) के तत्वावधान में जुलाई 17, 2018 को वर्ष की प्रथम बैठक के दौरान हिंदी प्रगामी प्रयोग के संबंध में 83 अधीनस्थ कार्यालयों की समीक्षा की गई तथा राजभाषा के उत्कृष्ट निष्पादन हेतु बड़े कार्यालयों की श्रेणी में यू.आर.एस.सी को प्रथम पुरस्कार प्राप्त हुआ।

श्रीमती गीता प्रसाद, हिंदी अधिकारी

THE MORNING ROSE

Morning was bright the sky deep blue; the garden was clothed in green
Amidst it she sat decked all red; A bud as red as I have seen
She glittered in the morning sun; the dew drops drooped her down
They rolled down all her petals smooth; to make her a silvery gown
Bloom did she in a circle full; to greet the morning light
The light fell on the pearl like dew; she shimmered in smiles all bright
The butterflies came down in flaps; and brushed her velvety gown
Naughtily did they brush her by; but never once did she frown
I went a near touched her petals; the drops dripped into my hand
Cheekily did she touch me back; the thorn did prick my hand
Yet was I abloom in mind; looking at nature all in sway
The blooming bud in all its glory; had already made my day

Mani KM, Sci./Eng.-SE, STG

SUPERANNUATION

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